APPENDIX D

Title :   Radio Frequency Local Area Network

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SST NETWORK FRAME FORMATS

General format.

Pre-amble	Flag	MAC Header	Bridge Header	Bridge Data	LLC Header	LLC Data	CRC	Flag

General Field Definitions.

Preamble	1 to 8 bytes
Flag start delimiter	1 byte
MAC Destination Address	2 bytes
MAC Source Address	2 bytes
MAC Control	1 byte
Bridge Control	2 bytes
Bridge Destination Address	2 bytes
Bridge Source Address	2 bytes
Bridge Packet Parms	packet type dependent
Bridge Packet Optional Parms	M bytes
LLC DSAP	1 byte
LLC SSAP	1 byte
LLC Control	1 or 4 bytes
LLC Data	N bytes
CRC-CCITT	2 bytes
Flag end delimiter	1 byte
(optional trailer)	1 or 2 bytes

16-bit Network Address Format.

bit 15	Mulltcast Flag
0	unicast frame
1	multicast or broadcast frame

bit 14-11	Node Type
0001	SS Terminal
0010	UHF Terminal
0011	All Terminals
0100	Bridge
1111	All Nodes

bit 10-0	Node Identifier
all 0's	root node identifer
all 1's	node without a network node identifier or any node

The well-known address of the root node is binary 0010 0000 0000 0000 (hexidecimal 2000).

MAC Control Byte (8 bits). *

Bits 7-5 in the MAC control bytes are used to specify the frame type. MAC frames are one of two basic types: 1) request, or 2) poll, depending on the state of the R/P bit.

Request frame types.

000	EOD (end-of-data)
001	DATA
010	ENQ (enquiry)
011	RFP (request-for-poll)

Poll frame types.

100	WFP (wait for poll)
101	REJECT
110	CLEAR
111	POLL

Request control byte:

bit 7	R/P	0 = request frame
bit 6	DATA	0 = data frame
bit 5	MORE	1 = middle of bracket (DATA) 0 = end of bracket (EOD) 1 = RFP 0 = ENQ
bit 4	reserved	must be zero
bit 3	PRIORITY	0 = normal, 1 = high
bit 2	SEQ	sequence number, modulo 2
bit 1-0	LAN ID	00, 01, 10 or 11

Poll control byte:

bit 7	R/P	1 = poll frame
bit 6	WAIT	0 = wait for poll
bit 5	MORE	0 = clear
bit 4	reserved	must be zero
bit 3	reserved	must be zero
bit 2	SEQ	sequence number, modulo 2
bit 1-0	LAN ID	00, 01, 10 or 11

Bridge Control Bytes (16 bits).

bit 15-14	Bridge Header Format	00 = multihop, 01 = point-to-point
bit 13	(reserved)	must be zero
bit 12	REQ/RSP	0 = request, 1 = response
bit 11	(reserved)	must be zero
bit 10-8	Packet Type	(see table below)
bit 7	Bridge Parms	1 = optional bridge parms
bit 6	RSPRQ	1 = end-to-end response packet required
bit 5-3	Protocol	000 = no data-link data, 001 = LLC data
bit 2	ATTI	1=attach indication
bit 1-0	(reserved)	must be zero

Bridge Packet Types.

000	Data Packet
001	(reserved)
010	Hello Packet
011	Attach Packet
100	Detach Packet
101	Address Resolution Packet
110	Reverse Address Resolution Packet
111	(reserved)

Optional Bridge Parameters - general format.

1-bit end-of-parms flag	1 = last optional parm
7-bit parm type	(see table below)
1-byte parm length	length of parm value field in bytes
M-byte parm value	(value or list of values)

84

Optional Parameters.

Parm Type	Parm Length	Description
01h	2 bytes	A 2-byte network address.
02h	6 bytes	Long Identifier.
03h	M*2	Decendant List. A list of 2-byte addresses.
04h	N*2	Detached List. A list of 2-byte addresses.
05h	P*2	Pending Message List. A list of 2-byte addresses.
06h	2 bytes	Distance (cost) from the root.
07h	Q bytes	Well-known alias.
08h	R bytes	Forward List. A list of 2-byte addresses.
09h	1 byte	Load Indicator. An indication of the channel load based on frame frequency.
0Ah	S bytes	Well-known alias of the root.
0Bh	6 bytes	Long identifier of the root.
0Ch	1 or 2 bytes	Awake time (in 100 millisecond units). All 1's denotes forever.
0Dh	1 or 2 bytes	Awake time offset (in 100 millisecond units).
0Eh	1 byte	Delivery service type. 0=deliver immediately. 1=store until the node is awake. 2=attempt to deliver immediately, then store until the node is awake.
0Fh	1 byte	Maximum stored message count. The maximum number of hello times that the parent node should store a message for the source child node.
10h	2 bytes	Decendent count.

Bridge Request Packet Formats.

Data (Type 000).

MAC Header	
Bridging Header	

Optional Bridging Parms
    - Max. stored message count.
    - Delivery service type.
    - Wake up time.
    - Wake up time offset.
	N bytes

LLC Header (optional)	
LLC Data (optional)	

Hello (Type 010).

MAC Header
Bridging Header

Attach (Type 011).

MAC Header	
Bridging Header	

Optional Bridging Parms
    - Decendant list
    - Max. stored message count.
    - Delivery service type.
    - Wake up time.
    - Wake up time offset.
	N bytes

LLC Header (optional)	
LLC Data (optional)	

Detach (Type 100).

MAC Header	
Bridging Header	

Optional Detach Parms
    - Decendant list
    - Forward list
	N bytes

Address Resolution (Type 101).*

MAC Header	
Bridging Header	
ARP Operation	1 byte
bit 7-4 (reserved)	must be zero
bit 3-0 reason code	0 = ok, other = error code
Network Address	2 bytes
Long ID/Alias type	1 byte
Long ID/Alias length	1 byte
Long ID/Alias	N bytes

*The Long ID/Alias can be a 6-byte identifier or an Alias. The address server will set the network address field to the network address of the associated node. If the Long ID (or Alias) cannot be found the network address field will be set to all 1's.

Reverse Address Resolution (Type 110).*

MAC Header	
Bridging Header	
RARP Operation	1 byte
bit 7 New Alias	1 = replace existing Alias
bit 6 New Long ID	1 = replace existing Long ID
bit 5 (reserved)	must be zero
bit 3-0 reason code	0 = ok, other = error code
Network address	2 bytes
Long ID type (02h)	1 byte
Long ID length (6)	1 byte
Long ID	N bytes
Alias type (07h)	1 byte
Alias length	1 byte
Alias	N bytes

*The requesting node must set the Long ID field and/or the Alias field. The source bridge address must be set to the source node type and a node ID of all 1's. The address server will set the network address field to the next available 16-bit address. If an address is not available, the field will be set to all 1's.

Bridge Response Packet Formats.

Hello (Type 010).

MAC Header	
Bridging Header	
Cost-to-root	2 bytes (0xFFFF = infinity)
Seed/Attach priority bit 7-2 seed bit 1-0 attach priority	1 byte 00 = lowest priority
Offset	1 byte 0-254 = transmission offset time in hundredths of seconds. 255 = unscheduled.
Root Priority bit 7-6 reserved bit 5-3 user priority bit 2-0 device priority	1 byte (must be zero) 000 = lowest priorty. 000 = lowest priority.
Root ID Sequence Number	1 byte
Optional fields - Root ID - Pending Message List - Decendant Count - Detached List - Load Indicator	N bytes

Attach (Type 011).

MAC Header
Bridging Header

Detach (Type 100).

MAC Header
Bridging Header

Address Resolution (Type 101).*

MAC Header	
Bridging Header	
ARP Operation bit 7-4 (reserved) bit 3-0 reason code	1 byte must be zero 0 = ok, other = error code
Network Address	2 bytes
Long ID/Alias type	1 byte
Long ID/Alias length	1 byte
Long ID/Alias	N bytes

*The Long ID/Alias can be a 6-byte identifier or an Alias. The address server will set the network address field to the network address of the associated node. If the Long ID (or Alias) cannot be found the network address field will be set to all 1's.

Reverse Address Resolution (Type 110).*

MAC Header	
Bridging Header	
RARP Operation bit 7 New Alias bit 6 New Long ID bit 5 (reserved) bit 3-0 reason code	1 byte 1 = replace existing Alias 1 = replace existing Long ID must be zero 0 = ok, other = error code
Network address	2 bytes
Long ID type (02h)	1 byte
Long ID length (6)	1 byte
Long ID	6 bytes
Alias type (07h)	1 byte
Alias length (N)	1 byte
Alias	N bytes

*The requesting node must set the Long ID field and/or the Alias field. The source bridge address must be set to the source node type and a node ID of all 1's. The address server will set the network address field to the next available 16-bit address. If an address is not available, the field will be set to all 1's.